

Ehrlichiosis

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Of the two forms of ehrlichiosis recognized in North America as tick-borne diseases, human monocytic ehrlichiosis (HME) is caused by the bacterium *Ehrlichia chaffeensis*. Human granulocytic ehrlichiosis (HGE) is caused by a species of *Ehrlichia* that has not yet been named (but is closely related to *E. phagocytophila* and *E. equi*). Sennetsu fever, documented so far only in Japan, is caused by *Ehrlichia sennetsu*.

B. Clinical Description

HGE and HME affect different white blood cells, but the signs, symptoms and clinical course of the two diseases are similar. Both cause sudden illness, with fever being the predominant sign. The clinical illness is similar to Rocky Mountain spotted fever, although patients more often have low white blood cell counts and less often have rash. In addition to fever, patients may have headache, chills, muscle and joint aches, nausea and, less frequently, vomiting and loss of appetite.

The rash varies in appearance and location. Patients with HGE rarely have a rash, while about 40% with HME have a rash. Severe, life-threatening complications can occur in persons not treated early in the disease. These complications may affect the lungs, bone marrow, brain, meninges (linings of the brain and spinal cord), kidneys, and blood. Fatal infections have been reported. Both diseases generally last about 2 weeks, and patients with uncomplicated illness recover completely. Coinfections with other tick-borne agents, such as the agents of Lyme disease and babesiosis, may complicate the clinical picture.

C. Vectors and Reservoirs

The primary vector of HME is *Amblyoma americanum*, the lone star tick. The vector for HGE is thought to be *Ixodes scapularis* (the deer tick), the same tick associated with Lyme disease and babesiosis. Natural animal reservoirs, if any, for HME and HGE are uncertain at this point.

D. Modes of Transmission

HME and HGE are acquired from a tick bite. How long the tick must remain attached before the transmission of *E. chaffeensis* or the agent of HGE occurs is unclear. Since bites from *I. scapularis* are often painless and may occur on parts of the body that are difficult to observe, cases of diagnosed HGE may have no known history of a tick bite.

E. Incubation Period

The period between infection and the first symptoms of HME or HGE appears to be 1 to 3 weeks, with an average of 12 days.

F. Period of Communicability or Infectious Period

Ehrlichiosis is not communicable from person-to-person.

G. Epidemiology

Because human ehrlichiosis has been recognized as a disease in North America only within the past decade, information about the epidemiology of the disease, its range, and the associated animal and insect vectors is incomplete. Most cases of HME have been reported from south central and southeastern states. Most cases of HGE have been reported in Wisconsin, Minnesota, and the Northeast. Only HGE, not HME, has been reported

to date in Massachusetts. Cases of HGE in Massachusetts have occurred in areas that are at high risk for Lyme disease, particularly Cape Cod, Martha's Vineyard and Nantucket. However, as Lyme disease has spread throughout Massachusetts, it is likely that HGE will also spread throughout the state. Most cases occur between April and October, when the risk of contact with ticks is the greatest.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

Report any case with the following laboratory criteria.

For a case to be clinically confirmed, *one* of the following laboratory criteria must be observed:

- A fourfold or greater change in antibody titer to *Ehrlichia* sp. antigen by immunofluorescence antibody (IFA) test in acute- and convalescent-phase specimens, ideally taken ≥ 4 weeks apart. HME diagnosis requires *E. chaffeensis* and HGE currently requires *E. equi* or HGE-antigen.
- A positive polymerase chain reaction assay. Distinct primers are used for the diagnosis of HGE and HME.
- The identification of intracytoplasmic morulae in blood, bone marrow, or cerebrospinal fluid leukocytes, and an IFA antibody titer ≥ 64 .

A probable case of ehrlichiosis is either:

- A single IFA serologic titer ≥ 64 or
- Intracytoplasmic morulae identified in blood, bone marrow, or cerebrospinal fluid white blood cells.

Note: See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute (SLI) does not currently provide testing of clinical specimens for *Ehrlichia* species. However, the SLI can submit specimens to the Centers for Disease Control and Prevention (CDC) for testing. Healthcare providers should send specimens to the SLI Viral Serology Laboratory. A complete case history should be included with each specimen. For additional information on submission of samples, contact the Viral Serology Laboratory (617) 983-6396.

Note: The State Laboratory Institute does not provide tick identification or testing of ticks for *Ehrlichia* species.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify where ehrlichiosis occurs.
- To focus preventive education.
- To target tick control measures.

B. Laboratory and Healthcare Provider Reporting Requirements

The Massachusetts Department of Public Health (MDPH) requests that healthcare providers and laboratories report to the local board of health in the community where diagnosed all cases of ehrlichiosis (by telephone, confidential fax or in writing). Please refer to the lists of reportable diseases (at the end of this manual's introductory section) for information.

C. Local Board of Health Reporting and Follow-Up Responsibilities

1. Reporting Requirements

The MDPH requests that local boards of health (LBOH) report any case of ehrlichiosis, as defined by the reporting criteria in Section 2) A, to the MDPH Division of Epidemiology and Immunization, Surveillance

Program using an official MDPH *Ehrlichiosis Case Report Form* (in Appendix A). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. Case Investigation

- a. It is requested that the LBOH complete a MDPH *Ehrlichiosis Case Report Form* (in Appendix A) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the case's healthcare provider or the medical record.
- b. Use the following guidelines to assist you in completing the form:
 - 1) Accurately record the demographic information, occupation, whether hospitalized (and associated dates), date of symptom onset, symptoms, laboratory information, treatment information, health care provider information, and outcome of disease (*e.g.*, recovered, died).
 - 2) Exposure history: use the incubation period range for HME and/or HGE (1–3 weeks). Specifically, focus on the period beginning a minimum of 1 week prior to the case's onset date back to no more than 3 weeks before onset for the following exposures:
 - a) Tick bite history: determine if the case was bitten by a tick. If yes, record information about the duration of tick attachment, date(s) and geographic location(s) where case was bitten.
 - b) Travel history: determine the geographic area(s) traveled to by the case, including known areas of high risk, such as Cape Cod, Martha's Vineyard and Nantucket.
 - c) Pet/animal exposure: determine if the case owns a pet or otherwise had contact with dogs, cats, or other animals.
 - 3) If the case was diagnosed at the same time with another tick-borne disease, such as Lyme disease, babesiosis, or Rocky Mountain spotted fever, please refer to other chapters and complete the appropriate case report form.
 - 4) The form asks whether the suspected diagnosis is HGE or HME. The vast majority of cases diagnosed in Massachusetts will be HGE. If the laboratory reports clearly state that the patient was diagnosed with HGE or HME, then check the appropriate box on the case report form. Otherwise, leave this section blank.
 - 5) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.
- c. After completing the form, attach lab report(s) and mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:
MDPH, Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130
- d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (105 CMR 300.200)

Since ehrlichiosis is not yet reportable by regulation in Massachusetts, no isolation and quarantine requirements currently exist under *105 CMR 300.200*.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

None.

D. Preventive Measures

Environmental Measures

Prevention of ehrlichiosis involves making your yard less attractive to ticks.

- Remove leaf litter and brush from around your home.
- Prune low lying bushes to let in more sunlight.
- Mow lawns regularly.
- Keep woodpiles in sunny areas, off the ground.
- If you are going to use insecticides around your home, always follow the label instructions and never use near streams or other bodies of water.

Personal Preventive Measures/Education

The best preventive measure is to avoid tick-infested areas. In areas where contact with ticks may occur, individuals should be advised of the following:

- Wear long-sleeved shirts and long, light-colored pants tucked into socks or boots.
- Stay on trails when walking or hiking and try to avoid high areas.
- Use insect repellants properly. Repellants that contain DEET (diethyltoluamide) should be used in concentrations no higher than 15% for children and 30% for adults. Remember, repellants should *never* be used on infants. Permethrin is a repellant that can only be applied onto clothing, *not* exposed skin.
- After each day spent in tick-infested areas, check yourself, your children, and your pets for ticks. Parts of the body ticks like most include the back of the knee, armpit, scalp, groin, and back of the neck. Promptly remove any attached tick using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out with steady pressure. Once removed, the tick should be drowned in rubbing alcohol or the toilet.

ADDITIONAL INFORMATION

The formal CDC surveillance case definition for ehrlichiosis is the same as the criteria outlined in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) Always refer to Section 2) A for the criteria in reporting a case to the MDPH.

REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases*, 24th Edition. Illinois, American Academy of Pediatrics, 1997.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*, 1997; 46:RR-10.

Chin, J., ed. *Control of Communicable Diseases Manual*, 17th Edition. Washington, DC, American Public Health Association, 2000.